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CURRENT LITERATURE

BOOK REVIEWS

The vegetation of Chile

The eighth volume of ENGLER and DRUDE's *Vegetation der Erde* is a monograph on the vegetation of Chile by Dr. KARL REICHE¹ of the National Museum at Santiago. This is the first volume of the series to deal with American vegetation. REICHE's long first-hand acquaintance with the Chilean flora makes this contribution a masterpiece, and all the more since fourteen years of effort have been spent with this volume in mind. Chile is to botanists the best-known part of South America, partly by reason of its peculiar accessibility, and partly by reason of the large number of foreign botanists who have made Chile their home, for a time at least. Among those who have contributed largely in recent years, and thus made REICHE's work more readily possible, are PHILIPPI, JOHOW, NEGER, and DUSÉN. Of particular importance is the work of R. A. PHILIPPI, who was active for over half a century, and who died in 1904 at the age of 96. A short account of botanical investigation in Chile forms the introduction to the work, and there is given a bibliography of Chilean botany comprising 550 titles, of which R. A. PHILIPPI and his son contributed nearly one hundred.

No country in the world presents distribution problems of greater interest than those of Chile, as may be suspected by reason of climatological variation. The vegetation ranges from that of the desert of Atacama in the north, perhaps the driest of all deserts, to the rain forests of the south, where there is a rainfall of 250^{cm} per annum. In northern or tropical Chile (18°–30°) there is the region of desert where there are no marked seasons, and where agriculture is confined to the oases and river banks. In central or subtropical Chile (30°–38°) there are sharply marked dry and wet seasons, and the vegetation varies from steppes northward to sclerophyll forests southward. In southern or temperate Chile (38°–55°) there is a sharp distinction between the very rainy coastal district, where seasonal changes are relatively slight, and the interior, where the climate is dry and where the winters are cold and the summers hot. This rainy coastal strip is characterized by evergreens (temperate rain forest), while there is a strip of deciduous forest (probably the only such forest of consequence in the southern hemisphere) in the drier and periodic climate to the east. It will be noticed that this distribution of forest departs from that given by SCHIMPER in that the deciduous forest lies east rather than south of the evergreens.

¹ ENGLER, A., UND DRUDE, O., *Die Vegetation der Erde*. VIII. REICHE, KARL, *Grundzüge der Pflanzenverbreitung in Chile*. pp. xiv + 374. *maps* 2. *figs.* 55. *pls.* 33. Leipzig: Wilhelm Englemann. 1907. M30.

The second part of the volume presents a detailed account of the most important families of vascular plants and their representatives, the vegetation forms, the formations, and the "biology" of the representative plants. Among the more interesting of the forest trees are the beeches (*Nothofagus*), of which five species are deciduous and three evergreen, and the conifers (*Araucaria* and *Fitzroya*); the latter forms swamp forests, perhaps comparable to our tamarack swamps. These conifers and beeches sometimes form pure forests, but most of the Chilean forests contain many tree species. Other important formations are the bamboo (*Chusquea*) thickets, xerophytic acacia thickets, and steppes.

The most detailed portion of the volume is that presenting the floristic features of the Chilean vegetation from north to south, and the delimitation of floral provinces. Many endemic species and monotypic genera are found in the country. The final chapters consider the relations of the Chilean flora to other floras (notably those of California, New Zealand, and Argentine), the life-history of the Chilean flora, and the modifications due to human influence. From the developmental standpoint the flora is made up of (1) a tropical contingent, the oldest of all, dating from the Mesozoic; (2) the Andine contingent, a xerophytic element associated with the rise of the Cordilleras; (3) the Californian and Mexican contingent; (4) the Antarctic contingent, mostly in southern Chile, and related to the New Zealand flora; (5) the boreal contingent, perhaps the most interesting of all, there being genera and even species in southern Chile that are common with the far north; (6) ubiquists and littoral pantropists; and (7) adventives. Many admirable plates add much to this important volume.—H. C. COWLES.

The pendulation theory

Now and then a geologist attempts to account for Permian glaciation within the tropics by supposing that the poles have shifted their position during the course of geologic history. Such theories are usually dismissed because they introduce more difficulties than they dispel. A few years ago PAUL REIBISCH, an engineer, laid before the *Verein für Erdkunde* at Dresden such a theory, known as the pendulation theory. There is now presented by Professor SIMROTH² of Leipzig a detailed account of the theory, together with a new alignment of facts of distribution. The essence of the pendulation theory is that the earth swings slowly to and fro upon an axis whose poles are in Ecuador and Sumatra. These poles are supposed to remain fixed, but the axial extremities that we commonly call the north and south poles are such for but a moment, speaking geologically. It will be seen that Ecuador and Sumatra must have been in the equatorial realm from the beginning, while for points now on the equator but 90° distant from these fixed poles (i. e. in the French Congo region and in the Pacific Ocean north of Samoa), there may have been in times past any conditions between polar

² SIMROTH, HEINRICH, Die Pendulationstheorie. pp. xii + 564. maps 27. Leipzig: Konrad Grethlein's Verlag, 1907. M12.